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Marlene H. Dortch
Secretary
Federal Communications Commission
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Washington, DC 20510

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Re: *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*,
GN Docket No. 17-183

Dear Ms. Dortch:

Nokia submits this letter to voice our support and agreement with the technical concerns raised by the Fixed Wireless Communications Coalition, Inc. (FWCC) on March 13, 2018 with an analysis prepared by RKF Engineering Services, LLC entitled "Frequency Sharing for Radio Local Area Networks in the 6 GHz Band (January 2018)" ("RKF Analysis"). The RKF Analysis was prepared on behalf of Apple Inc., Broadcom, Limited, Cisco Systems, Inc., Facebook Inc., Google LLC, Hewlett-Packard Enterprise, Intel Corporation, Microsoft Corporation, MediaTek Inc., and QUALCOMM Incorporated, and submitted to the Commission by those companies on January 26, 2018.

Nokia concurs with FWCC that such flawed analysis should not be used as the basis for analyzing potential coexistence of unlicensed mobile operations with the Fixed Service in the 6 GHz band. Nokia highlights the following aspects of the RKF Analysis that are of great concern:

- Predicts that only 1,904 Fixed Service paths will exceed the interference threshold RKF specified. That number is based on "average of average" model and in practice, the actual number of interference cases will likely far exceed the 1,904 cases.
- Ignores rural areas and focuses on urban areas.
- Assumes that average microwave sites have 50 dB of fade margin. The FCC ULS database shows an average of 40 dB of fade margin and the number is trending downward as higher modulation systems get deployed, making coexistence more difficult over time.
- Assumes that the interference caused by the mobiles in the busy period from 7 PM to 11 PM will be able to consume some of the fade margin of the microwave radios, but this period after

sunset coincides with a heavy fading period for microwave systems. This is the period in which the fade margin is most needed as shown in Figure 1 below.[1]

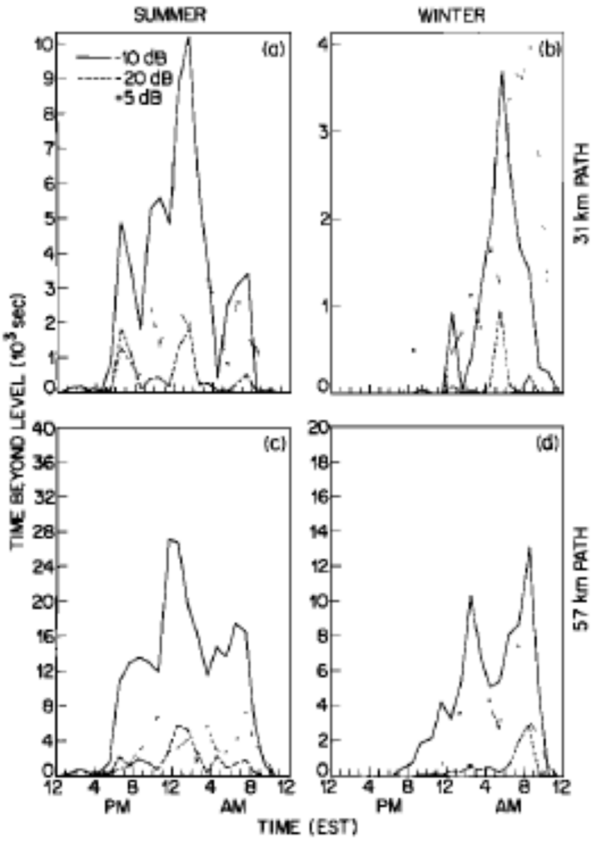

Figure 1- Diurnal Multipath Fading in Palmetto, Georgia

- Includes no evidence that any issues have been quantitively addressed and provides no provisions for resolving interference cases.
- Ignores the legal rights of licensed users and the rights of new users attempting to legally enter the band.
- Ignores the fact that one unlicensed transmitter with Line of Sight propagation to the Fixed Service receive antenna could harm that receiver.

Nokia continues to assert that any new use of the band must not cause interference into the incumbent Fixed Service because:

- The 6 GHz band is the single most heavily used microwave band. It is important for longer paths because it is unaffected by rain, unlike most of the other available bands. Favorable propagation means longer paths.
- There are over 80,000 licensed links in the combined Lower 6 GHz and Upper 6 GHz bands. Clearing this number of links is not realistic, and there is no clear alternative band offering similar propagation possibilities.

[1] "Microwave radio meteorology: Diurnal fading distributions," Radio Science, Volume: 17, Issue: 05, Sept.-Oct. 1982, James A. Schiavone, Bell Laboratories, Murray Hill, New Jersey.

- The band is the primary band for critical services including police/fire/ambulance, power grid protection, homeland security and communications systems. These systems operate at 99.9995% and 99.9999% availability. Increased interference would reduce the system availability.
- Traditionally, interference was avoided by a database of systems including operating parameters and locations. Prior coordination was carried out to mitigate interference before licensing. The proposed unlicensed mobiles would have no coordination method, no location and no contact information.

While Nokia believes the RKF Analysis is flawed, we remain open to exploring ways to introduce new services into the 6 GHz band. However, the legal obligations prohibiting interference (for example, the obligations set forth in Part 15 governing unlicensed operations) are not sufficient. In short, the Commission should not authorize new services in the upper or lower 6 GHz range until it first explores mitigation techniques and real-world engineering analysis to ensure any proposed operations will not cause harmful interference to fixed terrestrial services.

Please contact the undersigned with any questions in connection with this submission.

Respectfully submitted,

*/s/ Jeffrey A. Marks/*_____

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